SEQUENCE LISTING

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PEITZSCH, NICOLA
RENZ, ANDREAS

<120> FATTY ACID DESATURASE GENE FROM PLANTS

<130> 50669

<140> 10/069,772
<141> 2002-02-28

<150> PCT/EP00/08222
<151> 2000-08-23

<150> DE 199 41 609.5
<151> 1999-09-01

<160> 19

<170> PatentIn Ver. 3.3

<210> 1
<211> 1285
<212> DNA
<213> Calendula officinalis

<220>
<221> CDS
<222> (42)..(1175)

<400> 1
aaaagctcac ttctctgtga gggtaattat atatcaacaa c atg ggt gct ggt ggt 56
Met Gly Ala Gly Gly
1 5

cgg atg tcg gat cca tct gag gga aaa aac atc ctt gaa cgt gtg cca 104
Arg Met Ser Asp Pro Ser Glu Gly Lys Asn Ile Leu Glu Arg Val Pro
10 15 20

gtc gat cca ccg ttc acg tta agc gat ctg aag aaa gcg att cct acc 152
Val Asp Pro Pro Phe Thr Leu Ser Asp Leu Lys Lys Ala Ile Pro Thr
25 30 35

cat tgc ttt gag cga tct gtc atc cgg tca tca tac tat gtt gtt cat 200
His Cys Phe Glu Arg Ser Val Ile Arg Ser Ser Tyr Tyr Val Val His
40 45 50

gat ctc att gtt gcc tat gtc ttc tac tac ctt gca aac acg tat atc 248
Asp Leu Ile Val Ala Tyr Val Phe Tyr Tyr Leu Ala Asn Thr Tyr Ile
55 60 65

cct ctt att cct aca cct ctg gct tac cta gca tgg ccc gtt tac tgg 296
Pro Leu Ile Pro Thr Pro Leu Ala Tyr Leu Ala Trp Pro Val Tyr Trp
70 75 80 85

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ttt tgt caa gct agc atc ctc acc ggc ctc tgg gtc atc ggt cac gaa   344
Phe Cys Gln Ala Ser Ile Leu Thr Gly Leu Trp Val Ile Gly His Glu
                 90                  95                 100

tgt ggt cac cat gca ttt agc gac tac cag ttg att gat gac att gtt   392
Cys Gly His His Ala Phe Ser Asp Tyr Gln Leu Ile Asp Asp Ile Val
            105                 110                 115

gga ttc gtg ctc cat tcg gct ctc ctc acc ccg tat ttc tct tgg aaa   440
Gly Phe Val Leu His Ser Ala Leu Leu Thr Pro Tyr Phe Ser Trp Lys
        120                 125                 130

tat agc cac agg aat cac cac gcc aac aca aat tca ctc gat aac gat   488
Tyr Ser His Arg Asn His His Ala Asn Thr Asn Ser Leu Asp Asn Asp
    135                 140                 145

gaa gtt tac att cct aaa cgt aag tcg aag gtc aag att tat tcc aaa   536
Glu Val Tyr Ile Pro Lys Arg Lys Ser Lys Val Lys Ile Tyr Ser Lys
150                 155                 160                 165

ctt ctt aac aat cca ccc ggg cga gtg ttc act ttg gtg ttt cgg ttg   584
Leu Leu Asn Asn Pro Pro Gly Arg Val Phe Thr Leu Val Phe Arg Leu
                170                 175                 180

act tta gga ttt ccg tta tac ctc tta act aat atc tcg ggc aag aaa   632
Thr Leu Gly Phe Pro Leu Tyr Leu Leu Thr Asn Ile Ser Gly Lys Lys
            185                 190                 195

tac ggg agg ttt gcc aac cac ttt gat ccc atg agt cca att ttc aac   680
Tyr Gly Arg Phe Ala Asn His Phe Asp Pro Met Ser Pro Ile Phe Asn
        200                 205                 210

gat cgt gaa cgc gtt caa gtt ttg cta tcc gat ttc ggt ctt ctc gct   728
Asp Arg Glu Arg Val Gln Val Leu Leu Ser Asp Phe Gly Leu Leu Ala
    215                 220                 225

gta ttt tat gca atc aag ctt ctt gta gca gca aaa ggg gca gct tgg   776
Val Phe Tyr Ala Ile Lys Leu Leu Val Ala Ala Lys Gly Ala Ala Trp
230                 235                 240                 245

gta atc aac atg tac gca att cca gta cta ggt gta agc gtg ttc ttc   824
Val Ile Asn Met Tyr Ala Ile Pro Val Leu Gly Val Ser Val Phe Phe
                250                 255                 260

gtt ttg atc aca tat ttg cac cac acc cat ctc tca ctc cct cat tat   872
Val Leu Ile Thr Tyr Leu His His Thr His Leu Ser Leu Pro His Tyr
            265                 270                 275

gat tca acc gaa tgg aac tgg atc aaa ggc gcc tta tca aca atc gat   920
Asp Ser Thr Glu Trp Asn Trp Ile Lys Gly Ala Leu Ser Thr Ile Asp
        280                 285                 290

agg gat ttc ggg ttc ctg aat cgg gtt ttc cac gac gtt aca cac act   968
Arg Asp Phe Gly Phe Leu Asn Arg Val Phe His Asp Val Thr His Thr
    295                 300                 305
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cac gtc ttg cat cat ttg atc tca tac att cca cat tat cat gca aag   1016
His Val Leu His His Leu Ile Ser Tyr Ile Pro His Tyr His Ala Lys
310                 315                 320                 325

gaa gca agg gat gca atc aag cca gtg ttg ggc gag tac tat aaa atc   1064
Glu Ala Arg Asp Ala Ile Lys Pro Val Leu Gly Glu Tyr Tyr Lys Ile
                330                 335                 340

gac agg act cca att ttc aaa gca atg tat aga gag gct aag gaa tgc   1112
Asp Arg Thr Pro Ile Phe Lys Ala Met Tyr Arg Glu Ala Lys Glu Cys
            345                 350                 355

atc tac atc gag ccc gat gag gat agc gag cac aaa ggt gtg ttc tgg   1160
Ile Tyr Ile Glu Pro Asp Glu Asp Ser Glu His Lys Gly Val Phe Trp
        360                 365                 370

tac cac aag atg taa tcaaaaaggt gtatgtcaat gcaattgtat gcttaattaa   1215
Tyr His Lys Met
    375

gttgttaaac tttctattcc gtgtaataaa ttatcattaa gagaaaaaaa aaaaaaaaaa 1275

aaaaaaaaaa                                                       1285


<210> 2
<211> 377
<212> PRT
<213> Calendula officinalis

<400> 2
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             20                  25                  30

Lys Ala Ile Pro Thr His Cys Phe Glu Arg Ser Val Ile Arg Ser Ser
         35                  40                  45

Tyr Tyr Val Val His Asp Leu Ile Val Ala Tyr Val Phe Tyr Tyr Leu
     50                  55                  60

Ala Asn Thr Tyr Ile Pro Leu Ile Pro Thr Pro Leu Ala Tyr Leu Ala
 65                  70                  75                  80

Trp Pro Val Tyr Trp Phe Cys Gln Ala Ser Ile Leu Thr Gly Leu Trp
                 85                  90                  95

Val Ile Gly His Glu Cys Gly His His Ala Phe Ser Asp Tyr Gln Leu
            100                 105                 110

Ile Asp Asp Ile Val Gly Phe Val Leu His Ser Ala Leu Leu Thr Pro
        115                 120                 125

Tyr Phe Ser Trp Lys Tyr Ser His Arg Asn His His Ala Asn Thr Asn
    130                 135                 140
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Ser Leu Asp Asn Asp Glu Val Tyr Ile Pro Lys Arg Lys Ser Lys Val
145                 150                 155                 160

Lys Ile Tyr Ser Lys Leu Leu Asn Asn Pro Pro Gly Arg Val Phe Thr
                165                 170                 175

Leu Val Phe Arg Leu Thr Leu Gly Phe Pro Leu Tyr Leu Leu Thr Asn
            180                 185                 190

Ile Ser Gly Lys Lys Tyr Gly Arg Phe Ala Asn His Phe Asp Pro Met
        195                 200                 205

Ser Pro Ile Phe Asn Asp Arg Glu Arg Val Gln Val Leu Leu Ser Asp
    210                 215                 220

Phe Gly Leu Leu Ala Val Phe Tyr Ala Ile Lys Leu Leu Val Ala Ala
225                 230                 235                 240

Lys Gly Ala Ala Trp Val Ile Asn Met Tyr Ala Ile Pro Val Leu Gly
                245                 250                 255

Val Ser Val Phe Phe Val Leu Ile Thr Tyr Leu His His Thr His Leu
            260                 265                 270

Ser Leu Pro His Tyr Asp Ser Thr Glu Trp Asn Trp Ile Lys Gly Ala
        275                 280                 285

Leu Ser Thr Ile Asp Arg Asp Phe Gly Phe Leu Asn Arg Val Phe His
    290                 295                 300

Asp Val Thr His Thr His Val Leu His His Leu Ile Ser Tyr Ile Pro
305                 310                 315                 320

His Tyr His Ala Lys Glu Ala Arg Asp Ala Ile Lys Pro Val Leu Gly
                325                 330                 335

Glu Tyr Tyr Lys Ile Asp Arg Thr Pro Ile Phe Lys Ala Met Tyr Arg
            340                 345                 350

Glu Ala Lys Glu Cys Ile Tyr Ile Glu Pro Asp Glu Asp Ser Glu His
        355                 360                 365

Lys Gly Val Phe Trp Tyr His Lys Met
    370                 375
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<210> 3
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<220>
<221> modified_base
<222> (12)
<223> Inosine

<400> 3
ccdtayttct cntggaarww hagycaycg 29

<210> 4
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<220>
<221> modified_base
<222> (13)
<223> Inosine

<400> 4
ccartyccay tcngwbgart crtartg 27

<210> 5
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 5
gtgagggagt gagagatggg tgtggtgc 28

<210> 6
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 6
aacacactta cacctagtac tggaattg 28

<210> 7
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 7
tattccaaac ttcttaacaa tccacccg 28

<210> 8
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 8
caattccagt actaggtgta agtgtgtt 28

<210> 9
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 9
attagagctc atgggtgctg gtggtcggat gtcg 34

<210> 10
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 10
attactcgag tgacatacac ctttttgatt acatcttg 38

<210> 11
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 11
cggtcttctc gctgtatt 18

<210> 12
<211> 16
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 12
attacccaag ctgccc 16

<210> 13
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 13
aaactcgaga tgggtgcagg tggaagaatg ccgg 34

<210> 14
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic primer

<400> 14
aaaaagcttt cataacttat tgttgtacca gtacacacc 39

<210> 15
<211> 375
<212> PRT
<213> Crepis alpina

<400> 15

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Arg	Val	Ser	Val	Asp	Pro	Pro	Phe	Thr	Val	Ser	Asp	Leu	Lys	Gln	Ala
			20					25					30		
Ile	Pro	Pro	His	Cys	Phe	Lys	Arg	Ser	Val	Ile	Arg	Ser	Ser	Tyr	Tyr
		35					40					45			
Ile	Val	His	Asp	Ala	Ile	Ile	Ala	Tyr	Ile	Phe	Tyr	Phe	Leu	Ala	Asp
	50					55					60				

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Lys Tyr Ile Pro Ile Leu Pro Ala Pro Leu Ala Tyr Leu Ala Trp Pro
 65                  70                  75                  80

Leu Tyr Trp Phe Cys Gln Ala Ser Ile Leu Thr Gly Leu Trp Val Ile
                 85                  90                  95

Gly His Glu Cys Gly His His Ala Phe Ser Asp Tyr Gln Trp Val Asp
            100                 105                 110

Asp Thr Val Gly Phe Ile Leu His Ser Phe Leu Met Thr Pro Tyr Phe
        115                 120                 125

Ser Trp Lys Tyr Ser His Arg Asn His His Ala Asn Thr Asn Ser Leu
    130                 135                 140

Asp Asn Asp Glu Val Tyr Ile Pro Lys Ser Lys Ala Lys Val Ala Leu
145                 150                 155                 160

Tyr Tyr Lys Val Leu Asn His Pro Pro Gly Arg Leu Leu Ile Met Phe
                165                 170                 175

Ile Thr Phe Thr Leu Gly Phe Pro Leu Tyr Leu Phe Thr Asn Ile Ser
            180                 185                 190

Gly Lys Lys Tyr Glu Arg Phe Ala Asn His Phe Asp Pro Met Ser Pro
        195                 200                 205

Ile Phe Lys Glu Arg Glu Arg Phe Gln Val Leu Leu Ser Asp Leu Gly
    210                 215                 220

Leu Leu Ala Val Leu Tyr Gly Val Lys Leu Ala Val Ala Ala Lys Gly
225                 230                 235                 240

Ala Ala Trp Val Thr Cys Ile Tyr Gly Ile Pro Val Leu Gly Val Phe
                245                 250                 255

Ile Phe Phe Asp Ile Ile Thr Tyr Leu His His Thr His Leu Ser Leu
            260                 265                 270

Pro His Tyr Asp Ser Ser Glu Trp Asn Trp Leu Arg Gly Ala Leu Ser
        275                 280                 285

Thr Ile Asp Arg Asp Phe Gly Phe Leu Asn Ser Val Leu His Asp Val
    290                 295                 300

Thr His Thr His Val Met His His Leu Phe Ser Tyr Ile Pro His Tyr
305                 310                 315                 320

His Ala Lys Glu Ala Arg Asp Ala Ile Asn Thr Val Leu Gly Asp Phe
                325                 330                 335

Tyr Lys Ile Asp Arg Thr Pro Ile Leu Lys Ala Met Trp Arg Glu Ala
            340                 345                 350

Lys Glu Cys Ile Phe Ile Glu Pro Glu Lys Gly Arg Glu Ser Lys Gly
        355                 360                 365
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Val Tyr Trp Tyr Asn Lys Phe
370 375

<210> 16
<211> 374
<212> PRT
<213> Crepis palaestina

<400> 16
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Arg Val Ser Val Asp Pro Val Thr Phe Ser Leu Ser Glu Leu Lys Gln
20 25 30

Ala Ile Pro Pro His Cys Phe Gln Arg Ser Val Ile Arg Ser Ser Tyr
35 40 45

Tyr Val Val Gln Asp Leu Ile Ile Ala Tyr Ile Phe Tyr Phe Leu Ala
50 55 60

Asn Thr Tyr Ile Pro Thr Leu Pro Thr Ser Leu Ala Tyr Leu Ala Trp
65 70 75 80

Pro Val Tyr Trp Phe Cys Gln Ala Ser Val Leu Thr Gly Leu Trp Ile
85 90 95

Leu Gly His Glu Cys Gly His His Ala Phe Ser Asn Tyr Thr Trp Phe
100 105 110

Asp Asp Thr Val Gly Phe Ile Leu His Ser Phe Leu Leu Thr Pro Tyr
115 120 125

Phe Ser Trp Lys Phe Ser His Arg Asn His His Ser Asn Thr Ser Ser
130 135 140

Ile Asp Asn Asp Glu Val Tyr Ile Pro Lys Ser Lys Ser Lys Leu Ala
145 150 155 160

Arg Ile Tyr Lys Leu Leu Asn Asn Pro Pro Gly Arg Leu Leu Val Leu
165 170 175

Ile Ile Met Phe Thr Leu Gly Phe Pro Leu Tyr Leu Leu Thr Asn Ile
180 185 190

Ser Gly Lys Lys Tyr Asp Arg Phe Ala Asn His Phe Asp Pro Met Ser
195 200 205

Pro Ile Phe Lys Glu Arg Glu Arg Phe Gln Val Phe Leu Ser Asp Leu
210 215 220

Gly Leu Leu Ala Val Phe Tyr Gly Ile Lys Val Ala Val Ala Asn Lys
225 230 235 240

Gly Ala Ala Trp Val Ala Cys Met Tyr Gly Val Pro Val Leu Gly Val
245 250 255

```
Phe Thr Phe Phe Asp Val Ile Thr Phe Leu His His Thr His Gln Ser
            260                 265                 270

Ser Pro His Tyr Asp Ser Thr Glu Trp Asn Trp Ile Arg Gly Ala Leu
        275                 280                 285

Ser Ala Ile Asp Arg Asp Phe Gly Phe Leu Asn Ser Val Phe His Asp
    290                 295                 300

Val Thr His Thr His Val Met His His Leu Phe Ser Tyr Ile Pro His
305                 310                 315                 320

Tyr His Ala Lys Glu Ala Arg Asp Ala Ile Lys Pro Ile Leu Gly Asp
                325                 330                 335

Phe Tyr Met Ile Asp Arg Thr Pro Ile Leu Lys Ala Met Trp Arg Glu
            340                 345                 350

Gly Arg Glu Cys Met Tyr Ile Glu Pro Asp Ser Lys Leu Lys Gly Val
        355                 360                 365

Tyr Trp Tyr His Lys Leu
    370
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<210> 17
<211> 383
<212> PRT
<213> Borago officinalis

<400> 17

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             20                  25                  30

Val Gly Asp Leu Lys Lys Val Ile Pro Pro His Cys Phe Gln Arg Ser
         35                  40                  45

Val Leu His Ser Phe Ser Tyr Val Val Tyr Asp Leu Val Ile Ala Ala
     50                  55                  60

Leu Phe Phe Tyr Thr Ala Ser Arg Tyr Ile His Leu Gln Pro His Pro
 65                  70                  75                  80

Leu Ser Tyr Val Ala Trp Pro Leu Tyr Trp Phe Cys Gln Gly Ser Val
                85                  90                  95

Leu Thr Gly Val Trp Val Ile Ala His Glu Cys Gly His His Ala Phe
            100                 105                 110

Ser Asp Tyr Gln Trp Leu Asp Asp Thr Val Gly Leu Leu Leu His Ser
        115                 120                 125

Ala Leu Leu Val Pro Tyr Phe Ser Trp Lys Tyr Ser His Arg Arg His
    130                 135                 140
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```
His Ser Asn Thr Gly Ser Leu Glu Arg Asp Glu Val Phe Val Pro Lys
145                 150                 155                 160

Lys Arg Ser Gly Ile Ser Trp Ser Ser Glu Tyr Leu Asn Asn Pro Pro
                165                 170                 175

Gly Arg Val Leu Val Leu Leu Val Gln Leu Thr Leu Gly Trp Pro Leu
            180                 185                 190

Tyr Leu Met Phe Asn Val Ser Gly Arg Pro Tyr Asp Arg Phe Ala Cys
        195                 200                 205

His Phe Asp Pro Lys Ser Pro Ile Tyr Asn Asp Arg Glu Arg Leu Gln
    210                 215                 220

Ile Tyr Ile Ser Asp Ala Gly Ile Val Ala Val Met Tyr Gly Leu Tyr
225                 230                 235                 240

Arg Leu Val Ala Ala Lys Gly Val Ala Trp Val Val Cys Tyr Tyr Gly
                245                 250                 255

Val Pro Leu Leu Val Val Asn Gly Phe Leu Val Leu Ile Thr Tyr Leu
            260                 265                 270

Gln His Thr Gln Pro Ser Leu Pro His Tyr Asp Ser Ser Glu Trp Asp
        275                 280                 285

Trp Leu Lys Gly Ala Leu Ala Thr Val Asp Arg Asp Tyr Gly Phe Leu
    290                 295                 300

Asn Lys Val Leu His Asn Ile Thr Asp Thr His Val Ala His His Leu
305                 310                 315                 320

Phe Ser Thr Met Pro His Tyr His Ala Met Glu Ala Thr Lys Ala Ile
                325                 330                 335

Lys Pro Ile Leu Gly Asp Tyr Tyr Gln Cys Asp Arg Thr Pro Val Phe
            340                 345                 350

Lys Ala Met Tyr Arg Glu Val Lys Glu Cys Ile Tyr Val Glu Ala Asp
        355                 360                 365

Glu Gly Asp Asn Lys Lys Gly Val Phe Trp Tyr Lys Asn Lys Leu
    370                 375                 380
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<210> 18
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<220>
<221> MOD_RES
<222> (7)
<223> Tyr or Ile

<400> 18
Pro Tyr Phe Ser Trp Lys Xaa Ser His Arg
1 5 10

<210> 19
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<220>
<221> MOD_RES
<222> (5)
<223> Ser or Thr

<220>
<221> MOD_RES
<222> (8)
<223> Asp or Asn

<400> 19
His Tyr Asp Ser Xaa Glu Trp Xaa Trp
1 5